

WHAT IS CLAIMED IS:

1. An image forming apparatus that forms an image using an electrophotographic process, comprising:
  - a photoconductor that includes at least a conductive support, an undercoat layer, and a photoconductive layer, wherein the photoconductor has a surface roughness of either of a 10-point average roughness  $RzJIS$  of  $0.1 \mu m \leq RzJIS \leq 1.5 \mu m$  and a maximum height  $Rz$  of  $2.5 \mu m$  or lower;
  - a charger that charges the photoconductor;
- 10 a developing device that develops a latent image on the photoconductor with toner to obtain a toner image;
- 15 a transfer device that transfers the toner image to a transfer element;
- 20 a cleaning device including a cleaning blade that cleans off toner remaining on the photoconductor after the toner image has been transferred;
  - a belt that is suspended in a circumferential direction of the photoconductor, wherein
    - a 100-gram load is hanged at one end of the belt so that a contact length thereof with the photoconductor is 3 mm and a contact area is  $15 mm^2$ ,
    - the belt is a polyurethane flat type,
    - the belt has a JIS-A hardness of 83 degrees, width of 5 mm, a length of 325 mm, a thickness of 2 mm, and a dead weight of 4.58 grams,

a frictional resistance  $R_f$  of the photoconductor against the belt is  $45 \text{ gram-force} < R_f < 200 \text{ gram-force}$ , the frictional resistance  $R_f$  measured under such conditions that a value obtained by subtracting the 100-gram load from the read value of the digital force gauge is

5 determined as the frictional resistance  $R_f$ ; and

a digital force gauge that is fixed to another end of the belt and a value is read from the digital force gauge when the belt moves.

2. The image forming apparatus according to claim 1, wherein

10 the photoconductor has a 10-point average roughness  $R_{zJIS}$  of  $0.1 \mu\text{m} \leq R_{zJIS} \leq 1.0 \mu\text{m}$ ,

the belt has a JIS-A hardness of 83 degrees, and

15 the cleaning blade is in contact with the photoconductor in a counter direction and includes an edge having a surface roughness of 70  $\mu\text{m}$  or lower.

3. The image forming apparatus according to claim 1, wherein the frictional resistance  $R_f$  measured at a temperature ranging from  $15^\circ\text{C}$  to  $22^\circ\text{C}$  and a humidity ranging from 55 %RH to 65 %RH.

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4. The image forming apparatus according to claim 1, wherein a surface roughness of an edge of the cleaning blade ranges from  $10 \mu\text{m}$  to  $70 \mu\text{m}$ .

25 5. The image forming apparatus according to claim 1, wherein the

JIS-A hardness of an edge of the cleaning blade that comes in contact with the photoconductor ranges from 70 degrees to 90 degrees.

6. The image forming apparatus according to claim 1, wherein the  
5 cleaning blade comes in contact with the photoconductor in a counter direction at a contact pressure ranging from 10 g/cm to 40 g/cm.
7. The image forming apparatus according to claim 1, wherein the  
cleaning blade comes in contact with the photoconductor in a counter  
10 direction at a contact pressure ranging from 10 g/cm to 25 g/cm.
8. The image forming apparatus according to claim 1, wherein the  
cleaning blade is made of polyurethane rubber.
- 15 9. The image forming apparatus according to claim 1, wherein a  
maximum valley depth  $R_v$  of an edge of the cleaning blade in contact with  
the photoconductor is 40  $\mu\text{m}$  or less.
10. The image forming apparatus according to claim 1, wherein a  
20 maximum valley depth  $R_v$  of an edge of the cleaning blade in contact with  
the photoconductor is 30  $\mu\text{m}$  or less.
11. The image forming apparatus according to claim 1, wherein a  
lubricant is applied to an edge of the cleaning blade in contact with the  
25 photoconductor.

12. The image forming apparatus according to claim 1, wherein the toner has an average sphericity ranging from 0.96 to 0.998.
- 5 13. The image forming apparatus according to claim 1, wherein the cleaning device includes a cleaning brush provided on upstream side of the cleaning blade in a direction of rotation of the photoconductor, the cleaning brush being made of conductive looped fiber.
- 10 14. The image forming apparatus according to claim 13, wherein the cleaning brush is connected to either of a power supply that supplies a voltage to the cleaning brush and an electric circuit that grounds the cleaning brush.
- 15 15. The image forming apparatus according to claim 1, further comprising:  
a frictional-resistance reducing unit that reduces frictional resistance of the photoconductor so as to maintain the frictional resistance  $R_f$  in the range of  $45 \text{ gram-force} < R_f < 200 \text{ gram-force}$ .
- 20 16. The image forming apparatus according to claim 15, wherein the frictional-resistance reducing unit includes a lubricant applying unit that applies a lubricant to a surface layer of the photoconductor.
- 25 17. The image forming apparatus according to claim 16, wherein the

lubricant applying unit non-uniformly applies the lubricant over a surface layer of the photoconductor.

18. The image forming apparatus according to claim 16, wherein the  
5 lubricant is either of zinc stearate and fluororesin.

19. The image forming apparatus according to claim 1, wherein a charge transport layer of the photoconductor is an organic photoconductive layer.

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20. The image forming apparatus according to claim 1, wherein a charge transport layer of the photoconductor includes two layers, a charge transport layer without filler and a filler-containing charge transport layer with filler.

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21. The image forming apparatus according to claim 20, wherein a weight average particle size of the filler, which forms the filler-containing charge transport layer, ranges from 0.2  $\mu\text{m}$  to 0.7  $\mu\text{m}$ , and a content of the filler ranges from 10 % by weight to 30 % by weight of the total weight  
20 of the filler-containing charge transport layer.

22. The image forming apparatus according to claim 1, wherein the charger includes a charging member that is applied with either of a direct current voltage and a direct current voltage with an alternating current  
25 voltage superposed thereon, and sets a charging potential of the

photoconductor before formation of an electrostatic latent image to from 400 volts to 800 volts to form an image.

23. A process cartridge comprising a cartridge case that is detachably mounted in an image forming apparatus accommodates at least a photoconductor and a cleaning device of an image forming apparatus, wherein the image forming apparatus forms an image using an electrophotographic process and includes
  - a photoconductor that includes at least a conductive support, an undercoat layer, and a photoconductive layer, wherein the photoconductor has a surface roughness of either of a 10-point average roughness  $Rz_{JIS}$  of  $0.1 \mu\text{m} \leq Rz_{JIS} \leq 1.5 \mu\text{m}$  and a maximum height  $Rz$  of  $2.5 \mu\text{m}$  or lower;
  - a charger that charges the photoconductor;
  - a developing device that develops a latent image on the photoconductor with toner to obtain a toner image;
  - a transfer device that transfers the toner image to a transfer element;
  - a cleaning device including a cleaning blade that cleans off toner remaining on the photoconductor after the toner image has been transferred;
  - a belt that is suspended in a circumferential direction of the photoconductor, wherein
    - a 100-gram load is hanged at one end of the belt so that a contact length thereof with the photoconductor is 3 mm and a contact

area is 15 mm<sup>2</sup>,

the belt is a polyurethane flat type,

the belt has a JIS-A hardness of 83 degrees, width of 5 mm, a length of 325 mm, a thickness of 2 mm, and a dead weight of 4.58 5 grams,

a frictional resistance R<sub>f</sub> of the photoconductor against the belt is 45 gram-force < R<sub>f</sub> < 200 gram-force, the frictional resistance R<sub>f</sub> measured under such conditions that a value obtained by subtracting the 100-gram load from the read value of the digital force gauge is 10 determined as the frictional resistance R<sub>f</sub>; and

a digital force gauge that is fixed to another end of the belt and a value is read from the digital force gauge when the belt moves.

24. The process cartridge according to claim 23, wherein 15 the photoconductor has a 10-point average roughness R<sub>zJIS</sub> of 0.1 μm ≤ R<sub>zJIS</sub> ≤ 1.0 μm,

the belt has a JIS-A hardness of 83 degrees, and the cleaning blade is in contact with the photoconductor in a counter direction and includes an edge having a surface roughness of 70 20 μm or lower.

25. The process cartridge according to claim 23, wherein the frictional resistance R<sub>f</sub> measured at a temperature ranging from 15°C to 22°C and a humidity ranging from 55 %RH to 65 %RH.

26. The process cartridge according to claim 23, wherein a surface roughness of an edge of the cleaning blade ranges from 10  $\mu\text{m}$  to 70  $\mu\text{m}$ .
27. The process cartridge according to claim 23, wherein the JIS-A 5 hardness of an edge of the cleaning blade that comes in contact with the photoconductor ranges from 70 degrees to 90 degrees.
28. The process cartridge according to claim 23, wherein the cleaning blade comes in contact with the photoconductor in a counter direction at 10 a contact pressure ranging from 10 g/cm to 40 g/cm.
29. The process cartridge according to claim 23, wherein the cleaning blade comes in contact with the photoconductor in a counter direction at a contact pressure ranging from 10 g/cm to 25 g/cm.
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30. The process cartridge according to claim 23, wherein the cleaning blade is made of polyurethane rubber.
31. The process cartridge according to claim 23, wherein a lubricant 20 is applied to an edge of the cleaning blade.
32. The process cartridge according to claim 23, wherein the cleaning device includes a cleaning brush provided on upstream side of the cleaning blade in a direction of rotation of the photoconductor, the 25 cleaning brush being made of conductive looped fiber.

33. The process cartridge according to claim 23, further comprising:  
a frictional-resistance reducing unit that reduces frictional  
resistance of the photoconductor so as to maintain the frictional  
5 resistance  $R_f$  in the range of 45 gram-force <  $R_f$  < 200 gram-force.

34. The process cartridge according to claim 33, wherein the  
frictional-resistance reducing unit includes a lubricant applying unit that  
applies a lubricant to a surface layer of the photoconductor.

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35. The process cartridge according to claim 34, wherein the lubricant  
applying unit non-uniformly applies the lubricant over a surface layer of  
the photoconductor.

15 36. The process cartridge according to claim 34, wherein the lubricant  
is either of zinc stearate and fluororesin.

37. The process cartridge according to claim 23, wherein a charge  
transport layer of the photoconductor is an organic photoconductive layer.

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38. The process cartridge according to claim 23, wherein a charge  
transport layer of the photoconductor includes two layers, a charge  
transport layer without filler and a filler-containing charge transport layer  
with filler.

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39. The process cartridge according to claim 38, wherein a weight average particle size of the filler, which forms the filler-containing charge transport layer, ranges from 0.2  $\mu\text{m}$  to 0.7  $\mu\text{m}$ , and a content of the filler ranges from 10 % by weight to 30 % by weight of the total weight of the  
5 filler-containing charge transport layer.

40. A method of forming an image with an image forming apparatus, wherein the image forming apparatus forms an image using an electrophotographic process and includes  
10 a photoconductor that includes at least a conductive support, an undercoat layer, and a photoconductive layer, wherein the photoconductor has a surface roughness of either of a 10-point average roughness RzJIS of  $0.1 \mu\text{m} \leq \text{RzJIS} \leq 1.5 \mu\text{m}$  and a maximum height Rz of 2.5  $\mu\text{m}$  or lower;  
15 a charger that charges the photoconductor;  
a developing device that develops a latent image on the photoconductor with toner to obtain a toner image;  
a transfer device that transfers the toner image to a transfer element;  
20 a cleaning device including a cleaning blade that cleans off toner remaining on the photoconductor after the toner image has been transferred;  
a belt that is suspended in a circumferential direction of the photoconductor, wherein  
25 a 100-gram load is hanged at one end of the belt so that a

contact length thereof with the photoconductor is 3 mm and a contact area is 15 mm<sup>2</sup>,

the belt is a polyurethane flat type,

the belt has a JIS-A hardness of 83 degrees, width of 5 mm, a length of 325 mm, a thickness of 2 mm, and a dead weight of 4.58 grams,

a frictional resistance R<sub>f</sub> of the photoconductor against the belt is 45 gram-force < R<sub>f</sub> < 200 gram-force, the frictional resistance R<sub>f</sub> measured under such conditions that a value obtained by subtracting the 10 100-gram load from the read value of the digital force gauge is determined as the frictional resistance R<sub>f</sub>; and

a digital force gauge that is fixed to another end of the belt and a value is read from the digital force gauge when the belt moves.